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2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 2

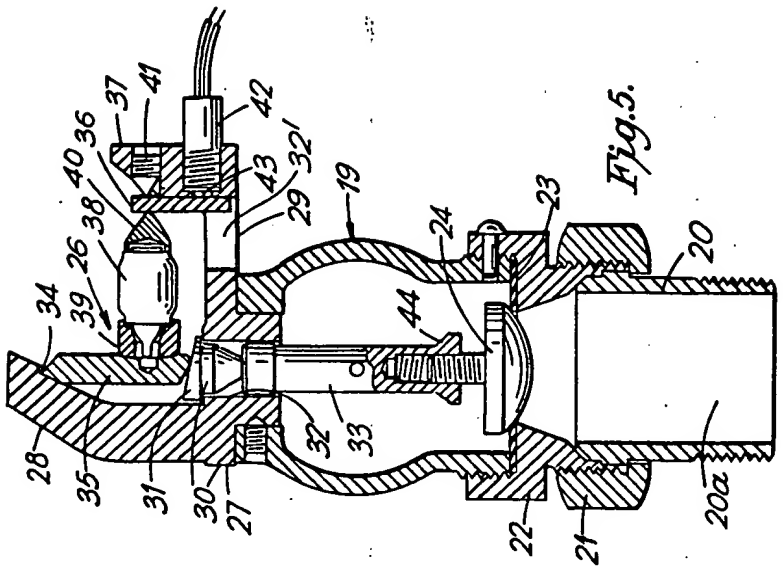
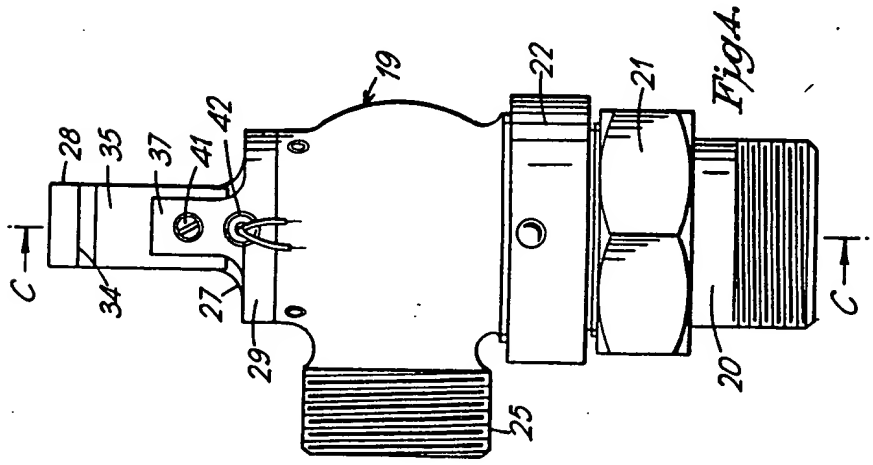


Fig.5.



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1359857 COMPLETE SPECIFICATION

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Sheet 1

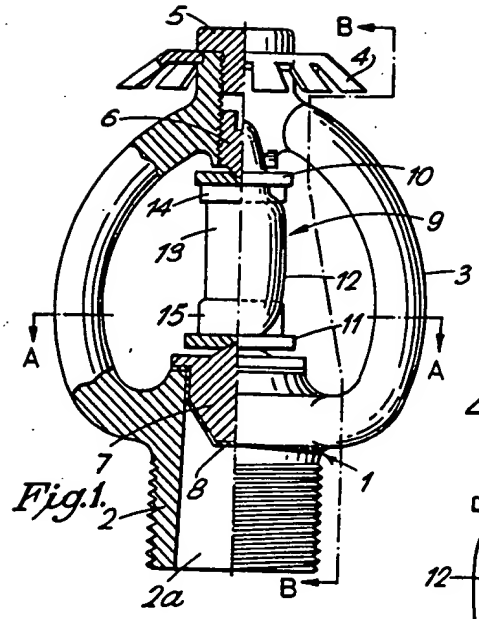

Fig.1.

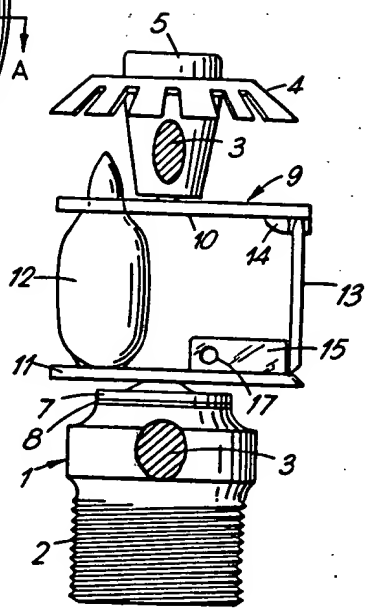

Fig.2.

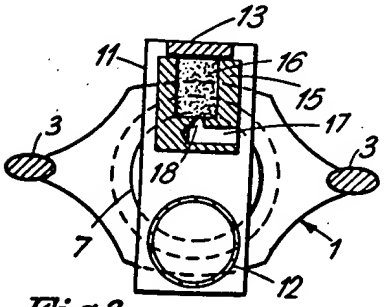

Fig.3.

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PATENT SPECIFICATION

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(72) Inventors DOUGLAS MICHAEL VENISON and CYRIL FISHER

(19)

(54) A FIRE EXTINGUISHING MEDIA RELEASE DEVICE FOR AUTOMATIC SPRINKLER INSTALLATIONS

(71) We, MATTHEW HALL AND COMPANY LIMITED, a Company organised under the laws of Great Britain, of Matthew Hall House, 101—108 Tottenham Court Road, London, W.1., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a fire extinguishing media release device for automatic sprinkler installations.

In automatic sprinkler installations for fire protection purposes, it is usual to provide a plurality of sprinkler heads over an area to be protected. In such installations, release of the fire extinguishing media may be effected by controlling each sprinkler head individually, or by controlling a plurality of so-called open sprinkler heads collectively using a single control valve. The term "release device" used in this Specification is intended to cover both an individually operable sprinkler head having a control valve, and a single control valve for a plurality of open sprinkler heads.

Most forms of built-in fire protection systems rely on heat sensitive elements for triggering off their operation. In known automatic sprinkler installations the heat sensitive elements comprise struts which maintain the release devices closed, these struts usually being in the form of frangible glass bulbs, solder links or chemical plugs. All of these forms of strut react to ambient temperature whereby, on reaching a predetermined temperature, they break down and thereby release the release device valve and permit the flow of the extinguishing media (usually water) therethrough and over the surrounding area.

With the aforementioned known release devices, the time taken to effect operation thereof is proportional to the sensititivity of the strut, i.e. its ability to absorb heat, and they are of course also dependent upon air movement carrying hot gases thereto in order to cause them to attain the necessary elevated temperature at which they are designed to operate.

In practice, periods of between three and ten minutes can elapse between commencement of a fire and operation of a sprinkler system with the result that the sytem has often to cope with quite large and intense fires.

It is among the objects of the present invention to provide an improved release device and an automatic sprinkler installation using such a device.

According to the present invention, there is provided an automatic sprinkler installation fire extinguising media release device, comprising a housing adapted to be incorporated in the pipework of the installation and formed with a passage for the flow therethrough of the fire extinguishing media, a valve member arranged to close said passage, and means for releasably holding the valve member in its closed position, wherein the means for releasably holding the valve member comprises a heat sensitive element and an explosively actuated element, the relative positions of the two elements being such that, in use, actuation of either element will release the valve member and permit the flow of the extinguishing media through said passage.

The invention is illustrated by way of example in the accompanying drawings in which:—

Figure 1 is an elevation, partly in section, of a release device according to the invention in the form of a sprinkler head,

Figure 2 is a section on the line B—B of Figure 1,

Figure 3 is a section on the line A—A of Figure 1, and

Figure 4 is an elevation of a release device according to the invention in the form of a control valve, and

Figure 5 is a section on the line C—C of Figure 4.

Referring to Figures 1 to 3 of the drawings, a sprinkler head comprises a housing 1 consisting of a threaded spigot 2 formed with a bore 2*a* which spigot serves to attach the head to the pipework of a sprinkler installation. Extending downwardly (in use) from the spigot 2 is a yoke 3 which supports a deflector member 4 which is held in position by a threaded bolt 5. Also supported in the yoke 3, at a position opposite to that of the spigot 2, is an adjusting screw 6.

A valve member 7 having a gasket 8 is provided so as normally to close the bore 2*a* of the spigot 2. For this purpose a strut assembly 9 is arranged between the valve member 7 and the adjusting screw 6.

The strut assembly 9 comprises a pair of spaced platforms 10 and 11 arranged to engage respectively the adjusting screw 6 and the valve member 7 and forming two sides of a rectangular frame. The third side of the frame is provided by a heat sensitive element in the form of a strut 12, for example a frangible glass bulb. The fourth side of the frame is provided by a strut 13 which abuts, at one end against a location stop 14 and, at its other end, against a housing 15 containing, or adapted to contain, an explosive charge 16. The container 15 has a fuse entry bore 17, the latter communicating with the explosive charge 16 via an inverted conical aperture 18 which facilitates transfer of the flame from a fuse fitted into the bore 17 to the explosive charge. Alternatively, the positions of the stop 14 and the housing 15 may be reversed.

It will be seen that both the glass bulb 12 and the strut 13 are off centre with respect to the axis of the sprinkler head.

Thus, with the aforementioned strut assembly 9, it will be appreciated that the sprinkler head can be attached, i.e. by release of the valve member 7, either by breakdown of the glass bulb 12 or by forceful displacement of the strut 13.

Breakdown of the bulb 12 is effected in the manner hereinbefore described, whereas displacement of the strut 13 is caused by ignition of a fuse which in turn ignites the explosive charge 16, the force of the explosion of which dislodges the strut 13. In either case, it will be seen that the assembly 9 will collapse and fall away whereby the valve member 7 will be displaced from its seating by the force of the extinguishing media and permit the latter to flow through the bore 2*a*.

The fuse may be such as to extend to any position remote from the head whereby a flame in the vicinity of the fuse will be such as to cause ignition thereof and subsequent actuation of the head. In this respect, the fuse is capable of burning at a rate of say one metre per second and tests have shown that, by virtue of the rapid action of the fuse, the sprinkler head of the present invention can be actuated in less than one fifth of the time required to actuate a known sprinkler head thereby allowing release of the extinguishing media at a very early stage in the progress of a fire.

The explosive charge may be of any description provided it has sufficient force to dislodge the strut 13, but preferfably impact type explosives should not be used. The charge may be a powder or a cartridge, or a combination of both.

Referring now to Figures 4 and 5 of the drawings, the release device is shown as a control valve for a plurality of open sprinkler heads and comprises a housing 1 having an inlet spigot member 20 presenting a bore 20*a*, the spigot member 20 being coupled by a nut 21 to an adapter 22 which is screwed to the housing 19. The adapter 22 supports an apertured diaphragm 23 which provides a seating for a valve head 24 which serves, when the control valve is positioned in the pipework of a sprinkler installation, to prevent the flow of fire extinguishing media through the bore 20*a*.

The housing 19 is also provided with an outlet boss 25 which, in use, communicates with a plurality of open sprinkler heads.

The housing 19 is further provided with a strut assembly 26 which comprises a bracket 27 having a first arm 28 and a second arm 29. The assembly also includes a frusto-conical element 30 having an angled surface 31, the element being supported, with sliding fit, in an aperture 32 formed in the second arm 29. The element 30 is in engagement with a valve stem 33 one end of which is attached to the valve head 24 and the other end of which is slidably received in the aperture 32.

Positioned between the angled surface 31 of the element 30 and a ledge 34 formed on the first arm 28 is a main strut 35.

A secondary strut 36, disposed parallel to the strut 35, is supported against a projection 37 of the second arm 29 to extend into a slot 32' formed in the arm 29. Positioned between, and perpendicular to, the two struts 35 and 36 is a frangible glass bulb 38, one end of the bulb 38 being received in a seating cap 39 which is positioned in a depression in the strut 35, and the other end thereof being received in a conical end cap 40 which engages a dimple formed in the strut 36. Positioned in the projection 37 is a screw 41 having a pointed end which engages a dimple formed on the opposite side of the strut 36 to that of the

end cap 40. The longitudinal axis of the screw 41 is slightly offset with respect to the axis of the bulb 38 with its end cap 40 as can be seen in Figure 5 of the drawings. Also mounted in the projection 37 is an electrically actuated explosive device 42 a plunger 43 of which is in close relationship with the strut 36.

Thus, it will be seen that a compressive sealing load is applied to the element 30, and thus also to the valve stem 33 and the valve head 24, by the action of the main strut 35 which pivots about the ledge 34 and rides up the angled surface 31 of the element 30. Pressure to hold the strut 35 in the aforementioned position is applied by the screw 41, via the strut 36 and the bulb 38 with its caps 39 and 40. As can be seen from Figure 5 of the drawings, the off centre relationship of the bulb 38 and the screw 41 is such as to maintain the strut in its vertical position.

In operation, when an electric signal is passed to the explosive device 42, its plunger 43 will be forced out rapidly so that it strikes the strut 36. This will cause the strut 36 to pivot about the screw 41 thereby angularly moving the bulb 38 so that pressure on the strut 35 is relieved. The pressure of the extinguishing media causes movement to continue until disengagement is effected between the cap 39 and the strut 35 and between the cap 40 and the strut 36. The bulb assembly and the strut 36 are then free to fall away. The strut 35 continues to slide over the angled surfaces 31 as the pressure of the media moves the valve head 24 away from its seating 23 and, together with the element 30, also falls away. The valve head 24 with the valve stem 33 continue their movement away from the seating 23 until a tapered projection 44 on the valve stem engages the bracket 27 at which time the valve is fully open and extinguishing media is continually passed out through the outlet boss 25.

Alternatively, or where the explosive device 42 fails to operate, when the ambient temperature reaches a predetermined value, the bulb 38 shatters. This results in the falling away of the bulb 38 and its caps 39 and 40, and of the strut 36. The strut 35 then releases the element 30 and operation proceeds in the manner hereinbefore described.

Thus, as in the case of the sprinkler head hereinbefore described, the control valve is actuated either by forceful displacement of the strut 36, or by breakdown of the bulb 38.

In a further embodiment of the invention, not illustrated, the device of Figures 1 to 3 may be modified by replacing the explosive device 15 with an electrically acctuated explosive device as shown at 42 in the embodiment of Figures 4 and 5. Similarly, the device 42 of Figures 4 and 5 may be replaced by an explosive device 15.

The electric signal passed to the explosive device 42 may be triggered off, by known means, at a position remote from the release device as a result of direct heat, or the presence of smoke or flame, or the presence of any other hazard or hazard indicating means, or by manual operation.

At the present time, large shops, stores and warehouses having sprinkler installations with known heads are subject to excessive water damage and require large water supplies and high pressure to deal with the size of fire that can occur during the time lag between commencement of the fire and actuation of the sprinkler system. By using the devices of the present invention, due to the short period of time between the beginning of the fire and operation of the sprinkler heads, the fire to be dealt with is very much smaller so that the resultant water damage will be less, and the quantity of water necessary to extinguish the fire is reduced.

The devices of the present invention will also reduce the intensity of fire risks such as those which occur in fuel oil stores, transformers, power station generators and ink paint and varnish stores since, should in any of these cases the build-up of heat reach dangerous proportions without the presence of flames, the head or heads would operate in the normal manner, i.e. by destruction of the bulb 12 or 38 and this would cool the risk area and reduce or remove the possibility of instantaneous combustion which might occur.

The invention has particular advantages when applied to areas which need to be served by deluge systems, i.e. systems where a whole area requires immediate protection irrespective of the point of fire commencement.

WHAT WE CLAIM IS:—

1. An automatic sprinkler installation fire extinguishing media release device, comprising a housing adapted to be incorporated in the pipework of the installation and formed with a pasage for the flow therethrough of the fire extinguishing media, a valve member arranged to close said passage, and means for releasably holding the valve member in its closed position, wherein the means for releasably holding the valve member comprises a heat sensitive element and an explosively actuated element, the relative positions of the two elements being such that, in use, actuation of either element will release the valve member and permit the flow of the extinguishing media through said passage.

2. A device as claimed in claim 1, in which the housing comprises a spigot having a bore providing the media flow passage with the

valve member received therein, a yoke extending away from the spigot, and a deflector plate attached to the yoke at a position remote from the spigot.

3. A device as claimed in claim 2, in which the means for releasably holding the valve member comprises a pair of spaced platforms engaging respectively the valve member and an adjusting screw positioned in the yoke adjacent the deflector plate, the heat sensitive element extending between the two platforms at a position adjacent one end of the platforms, and the explosively actuated element extending between the two platforms at a position adjacent the other end of the platforms.

4. A device as claimed in claim 3, in which the heat sensitive element comprises a frangible glass bulb.

5. A device as claimed in claim 3 or claim 4, in which the explosively actuated element comprises a strut which is operatively associated with an explosive device mounted on one of the platforms.

6. A device as claimed in claim 1, in which the housing is provided with an inlet spigot, an outlet boss arranged to communicate with the inlet spigot, and an apertured diaphragm arranged adjacent the inlet spigot and providing a seating for the valve member.

7. A device as claimed in claim 6, in which the housing is provided with a bracket having a first arm extending generally parallel with the axis of the inlet spigot and a second arm extending perpendicular to the axis of the spigot which bracket supports the heat sensitive and explosively actuated elements, the second arm having an aperture in which one end of a valve stem attached to the valve member is slidably received.

8. A device as claimed in claim 7, which includes a frusto-conical element having an angled surface lying transversely to the axis of the inlet spigot which element is positioned in the aperture of the second arm in engagement with the valve stem, a first strut extending between the angled surface of the frusto-conical element and a pivot point on the first arm, and a frangible glass bulb providing the heat sensitive element extending between, and perpendicular to, the first strut and a second strut which forms the explosively actuated element, the second strut being supported against a projection formed on the second arm of the bracket.

9. A device as claimed in claim 8, in which the frangible bulb is held at one end in a seating cap positioned in a depression in the first strut and, at its other end, in a conical cap which engages a dimple in the second strut.

10. A device as claimed in claim 9, in which a pointed screw is arranged in the projection of the second arm to engage a dimple formed in the second strut, the dimple being offset with respect to the dimple which is engaged by the conical cap of the frangible bulb.

11. A device as claimed in any one of claims 8 to 10, in which an explosive device is supported in the projection of the second arm at a position adjacent the second strut.

12. A device as claimed in any one of clain : 5 to 11, in which the explosive device is of the type which is actuated by an inflamable fuse.

13. A device as claimed in any one of claims 5 to 11, in which the explosive device is of the type which is actuated by an electric signal.

14. A device as claimed in claim 13, in which the electric signal is responsive to the presence of heat, flame, smoke or manual operation.

15. A fire extinguishing media release device substantially as hereinbefore described with reference to Figures 1 to 3 or 4 and 5 of the accompanying drawings.

16. An automatic sprinkler installation having a release device as claimed in any one of claims 1 to 15.

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